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Cancer Observation in Zero G

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(Getaway Special Program)

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ABSTRACT

This is a proposal for an experiment observing cancer cell activity when exposed to zero gravity. A step by step outline of the process of the experiment is included. Diagrams of basic construction of the experiment and the equipment illustrate the process. Explanations of pre-experiments and parallel experiments are discussed. Types of cells, wash solvents, and culture material are given in the discussion.

INTRODUCTION

It is not known why normal health cells turn cancerous, but as in any other research any deviation from the means makes possible the formation of theories. With this experiment, a deviation maybe found. Even if there is no deviation the data may lead to a better understanding of cancer.

It is theorized that cancer starts in the mitocondria (the powerhouse) of the cell. It is also theorized that certain polycyclic hydrocarbons aid in cancerous growth. These are a few pieces of a giant jigsaw puzzle with many pieces still missing. By finding out if gravity is related to cancerous division the answer to this puzzle may become more recognizable.

THE PROCESS

An outline of the process is as follows.
-One or two days prior to launch:
1) Door A opens dropping a frozen pellet of hela cells into a cleaning flask.
2) Valve A opens and a vacuum is exerted pulling wash solvent into the cleaning flask with cells. Vacuum continues to be exerted until waste wash solvent has been pulled into the waste flask. Relief valves prevent built up pressure.
3) Step (2) repeated with valve B open and distilled water used.
4) Valve D opens, a small vacuum is exerted and hela cells are pulled into the flask containing the culture material. Valve D closes.
-After the orbitor is in orbit:
5)Valves E and H open and a small vacuum is exerted which pulls a small sample (≅.1ml) into a quartz window. Valves E and H close.
6) A video camera turns on and starts to record data.
-After six hours:
7) Camera turns off.
8) Valves F and H open, a small vacuum is exerted and wash solvent rinses old cells into waste flask.
9) Valve F closes and G opens to rinse a second time with distilled water.
10) Valve G closes and E opens. A new sample is brought into the quartz window and the process continues.

SAMPLES USED

The sample of cancer cells used will be hela cells mixed with DMSO and frozen in liquid nitogen. A wash solvent of ethanol would be advantageous. The most ideal culture material that may be used is Dubecco's Modified Eagles Medium +10% serum (Fetal Calf Serum), but other alternatives are available.

CONSTRUCTION

The basic construction is as diagramed in the illustration. Some of the more intricate systems are explained below.

The Vacuum System. By pulling back on the plungers in the direction indicated a suction is created. Relief plungers located on the opposite side prevent pressure build up.

The Valve System. The valves most reasonable for the experiment would be simple stopcocks as on the bottom of a buret or sep funnel.

Camera and Microscope System. A self-focusing camera set on top of a set focus microscope will function as my data collection apparatus. The self-focusing camera compensates for any misfocusing of the microscope.

PRE-LAUNCH AND PARALLEL EXPERIMENTS

Before launch the experiment will be tried to ensure validity of the theory. While the experiment is being performed it would be ideal to perform three other experiments along with it. These three experiments are: An observation with normal cells in zero gravity. This experiment should be in the canister with the cancer observation in zero gravity. The second parallel experiment is an observation of cancer cells in a gravity environment. This can be performed on earth in a controlled environment. The last parallel is an observation of normal cells in an earth environment. The observation can be performed in the identical environment as cancer observation with gravity.

SAFETY

The hela cells will not contaminate other payloads if they are exposed to them. A heater will have to be running as soon as the frozen hela cells are dropped in order to keep the temperature at 37°C (range 36-38°C).

The motor to run the heater may be a safety hazard. Liquid nitrogen is my biggest consideration and unless a powerful refrigeration unit can be fabricated it is completely necessary to the experiment.

CONDITIONS

The conditions in the canister will be a temperature of ≅37°C and pressurized at one atm. with an air content of 75% oxygen and 25% carbon dioxide.

DATA COLLECTION

A video tape is my only form of data to which I will be able to analyse. Cancerous reproduction will be witnessed in these tapes. From this a rate of reproduction can be calculated. Also size deviations will be witnessed.

A thermometer and chronometer will be in view so a more exact record may be kept.